2CV FUEL FILTER
Revision 5

Graeme Dennes

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While 2CV owners usually change the fuel filter during the vehicle's annual service, this may may be as close as the owner comes to knowing and understanding fuel filters. There's surprisingly more to know, because filters ain't filters!

The life of an internal combustion engine is intrinsically linked to the cleanliness of the fuel burnt in the engine. The majority of modern vehicles use fuel filters which remove particles down to the 10-micron or 20-micron ranges. Some vehicles use 5-micron filters. A micron is a millionth of a metre or a thousandth of a millimetre. For example, a human hair is around 65 microns in diameter.

The question is: What can we do to help extend the life of the 2CV engine? After all, dirty fuel is dirty fuel and engine wear is engine wear. And the answer? *Fit a 10-micron fuel filter to the 2CV.* Well, that should be easy enough to arrange…

Citroën fitted a small inline plastic fuel filter to the 2CV, specified as a Champion L101 (Haynes manual, page 49). An internet search found several overseas suppliers selling this filter, with their web sites stating it filters to 10 microns. Ah, that's looking good! The writer contacted the suppliers to seek a link or reference to a Champion document which states this particle size specification for the filter. Although the suppliers responded quickly, *none* were able to provide a reference or link to a Champion document. (I chose not to ask where the stated 10-micron figure on their websites originated!) The next contact was to an overseas Champion filter distributor, who kindly sent me a link to a Champion filter document containing the specifications for the L101. It also included a link to the specifications for the L101's replacement, the Champion CFF100101. Unfortunately, neither of these filters' specifications showed the particle sizes. After seeking further advice on the L101's particle size, the writer was advised that this information *is for use by their internal engineering department only!*

It astounds me that particle size information is not formally available from the manufacturer, given that it is *the most fundamentally important property of a fuel filter!* Um, hello…?

Ah, let's take a deep breath and think outside the box! What type of fuel filter should we be searching for? As our 2CVs are usually travelling only a few thousand kilometres between annual servicings, the surface area of the filter element should not be of concern. Also, as the 2CV fuel pump pressure is specified at 2.6 to 2.9 PSI at zero flow, the maximum flow rate and maximum working pressure should not be of concern.

This enabled the filter search criteria to be shortlisted to four: (1) it should filter particles down to 10 microns, in line with modern day vehicle fuel filters; (2) the fuel filter requires 6 mm fuel spigots to match the 5.5 mm inside diameter of the rubber fuel hose used in the 2CV; (3) it needs to be an in-line, standalone filter, and (4) it must be relatively small and lightweight so it can be self-supporting.

Ok. Let's check locally. An internet search on Australian web sites was done in the hope of finding a suitable filter from a local supplier. Numerous fuel filters were found which match the last three criteria, but *none provided particle size data.* One of the sellers was contacted in the hope of obtaining the data, and although very helpful, *the seller advised they didn't have that information and felt it may not be available!*

One could ask: why is such a critically important specification being withheld from the consumer?

Mmm. Although pure supposition, the writer believes it could benefit filter manufacturers, distributors and retailers for the following reasons. All other things being equal, a 10-micron filter has to cost more to manufacture than a 40-micron filter because it is more restrictive to the fuel flow and therefore needs more surface area, increasing the manufacturing cost and thus the cost to the consumer. By deduction, perhaps a way to attract a customer to buy a filter is to keep the customer's cost down by selling lower-cost (read: larger particle size) filters. These will be priced much more in line with the customer's buying expectations, along with the advice that "this fuel filter is specified for your vehicle". Ah, job done! The customer may not mention particle size or even be aware of the term particle size or even that it is a *critical* filter parameter. In a nutshell, excluding the particle size specification from the manufacturer's product data sheets certainly is a way to keep it out of sight and out of mind of the consumer. If you don't know about, you'll never go looking for it!

The bottom line? Why hide a critical filter specification? To repeat, who is benefiting from this action? As a consumer, the writer certainly is not! Hence this article! However, as already noted, this is all pure speculation by the writer, and there may well be justifiable reasons for why the particle size is not formally stated or made available on request. The writer just can't currently think of any such reasons…

Ok, moving right along. The fuel filters provided by popular local filter brands were also canvassed. A suitable range of fuel filters from Repco and Ryco were identified which match the last three criteria. Some of them stated the particle size while some did not. The respective product managers were contacted in the hope of obtaining the missing particle size data, and fortunately, the data was provided for all the filters requested by the writer. Thank you Repco and Ryco! The results? The popular Repco filters RPF1003, RPF1005, RPF1022, RPF1415 and RPF9192 are specified at 40 microns, whilst the popular Ryco filters Z4, Z14, Z750 and MF1 are specified at 17 microns. Regrettably, in view of the writer's first search criteria, none of these filters is a match. Keep searching!

The writer has been using the 40-micron Repco RPF1415 fuel filter for 16 years (well, not the same one!).

As an aside, the writer now understands why there is always sediment lying on the bottom of the fuel bowls of his 2CV carburettors when serviced, even though the vehicles usually travel less than 5000 Km each year. Why? Because a 40-micron filter is not the most capable filter for removing foreign material in the fuel for the 2CV. It doesn't filter particles below 40 microns. We can do better. Use a 10-micron filter.

Alright, let's do a global search. Here's what was found. A grand total of **one, yes, one,** fuel filter matching the four search criteria was located by the writer – the Oregon 07-124. This filter is available through Amazon, eBay and many North American retailers.

The photo at right shows the Oregon 07-124 fuel filter. The filter and specifications are shown on the manufacturer's web site at: Oregon 10-Micron Fuel Filter.

It also shows information on USA/Canadian retailers. A link to the Oregon filter on Amazon is provided here: Oregon Fuel Filter

There may be other fuel filters which match the writer's search criteria. *Should the reader know of any, the writer would be grateful to receive the details from you.* Your information will be added to the next revision of this article for the benefit of the readers.

Please note:

This article is not intended as an advertisement for the Oregon filter, but rather, is offered as information on the only 10-micron fuel filter known to the writer which suits the 2CV.

Important Update

The writer has again contacted fuel filter manufacturer Ryco and spoke to an engineer about the availability of a 10-micron fuel filter for the 2CV. The engineer inquired about the fuel pump pressure in the 2CV, and when I said it's specified as 2.6 to 2.9 PSI at zero flow, he said this pressure is *lower than the fuel pressures found in most carburetted vehicles,* a fact which wasn't known to the writer. Because of this, the engineer said a 10-micron filter could prove to be too restrictive and *cause fuel starvation*.

The last point concerned me greatly, as it means that under driving conditions of sustained high engine loads, such as travelling up a long hill, if the fuel level in the carburettor dropped because of flow restrictions in the filter, it would cause a leaning of the fuel mixture.

A lean mixture burns slower than a normal mixture due to the lower density of fuel molecules, and the extended burn time exposes the engine internals to the temperatures in the combustion space for a longer time, which leads to higher engine temperatures.

It can also lead to pinging (detonation), which causes a significant increase in heat. Detonation results when pockets within the fuel mixture ignite spontaneously and explode, rather than burning smoothly and progressively through the fuel mixture. This creates a shockwave (which we hear as pinging), leading to a rapid and uncontrolled pressure rise within the combustion space. This in turn creates a significant spike in combustion temperatures which could be sufficient to cause damage to engine parts such as valves, cylinder heads and pistons. $$Ouch!

In summary, while there's no hard evidence showing that a 10-micron filter in the 2CV *will* result in the leaning of the fuel mixture in certain situations, the writer cannot ignore the possibility of this and must err on the side of caution.

Contrary to the writer's previous advice, a 10-micron filter is not recommended for the 2CV.

Suitable fuel filters would be the 17-micron Ryco Z4, Z750 and MF1 filters. Other manufacturers may also have suitable 17-micron or 20-micron filters.

The writer regrets any inconvenience caused by this change in fuel filter recommendation.

Filter Testing Standards

There are filter testing standards which describe the methods used to test and specify the filtering performance of fuel filters. In the strictest sense, the micron figure alone does not completely describe the filtering performance of a filter. Given historical filter industry developments and today's vehicle industry norms and specifications, the micron figures will, in part, carry some useful information.

If a filter has a rating of "10 microns", it has some ability to capture particles as small as 10 microns; however, because there is no single accepted way to *measure and describe* the size of particles that a filter can capture and the total amount of particles that a filter can hold, more information is needed. For a micron rating to be truly useful, we must know the filter's removal efficiency for the specified particle size. When you see a filter marked "10 microns", you will not know exactly what that means unless you also have a description of the test method and standards which were used to determine that micron rating.

The most recognized and utilised test methods are prepared under the standards of the Society of Automotive Engineers (SAE) for North America, and the standards of the International Standards Organisation (ISO) for the rest of the world. Specifically, the key test method standards are SAE J905, SAE J1488, SAE J1839 and ISO 4020. All of these test methods require complex and sophisticated test equipment.

Filter micron ratings are often based on one of the following three testing methods, but variations are possible:

a. **Nominal Micron Rating** (NMR) Expresses the ability of the filter to capture particles of the specified size at an efficiency between 50% and 90%. For example, a nominal filter rating of 90% at 10 microns means the filter captures 90% of the particles at the 10-micron size. NMR usually means the filter can capture a given percentage of particles of the stated particle size.

b. **Absolute Micron Rating** (AMR). Means that the filter is capable of removing at least 98.7% of the particles of the specified size. This rating is determined through a single-pass or multi-pass test in which fluid containing measurable particles is passed through a flat sheet of filter material. Particles that pass through are measured and counted. This rating is more informative than the NMR.

c. **Multi-Pass Beta Rating** (MPBR). The MPBR has been accepted by many filter manufacturers, **but the rating is not publicised by most of them as a means of identifying or specifying their filter properties.** (Emphasis by the writer.)

Most filter manufacturers follow these test methods, but several manufacturers use test methods of their own design.

Writer's Suspicions Confirmed

In line with the writer's earlier suspicions, the third test method above **confirms** that many filter manufacturers are deliberately withholding filter specifications from the consumer. So there we have it!

Yeah, the tractor operator asked if I could give him a jump start…

The photo above shows the writer's 2CV alongside wheat sowing machinery operating near Young, NSW. The overall length of the sowing machinery is 55 metres, and up to 30 acres per hour can be sown (yes, that's one acre every two minutes!), with all the individual steps done in a single pass, including the fertiliser. The machinery operation and the sowing rates are computer controlled by the operator in the cabin. The all-up cost of this rig would buy *several dozen* very good condition 2CVs!

The three fuel filters used in the 12.5 litre diesel engine above remove particles down to 10 microns. Yes, that's probably good enough for the 2CV too!

Photos from Raid Cape York 2022

The writer took the above photo at the service station in Seisia at the top of Cape York Peninsula. This is red dust country, as depicted in the photo. The need for a 10-micron fuel filter is paramount at the Top End, given the greater propensity for dust and dirt to gain entry to the engine via the fuel.

Five of the Raid 2CVs at the northern-most tip of Cape York Peninsula in 2022. Again, plenty of red dust in the area to make its way into the engine through the fuel filter - as well as through the air filter…!

LIST OF ARTICLES BY THE WRITER

The articles written by the writer, listed below, may be freely downloaded from either of the following club websites by clicking on the adjacent links and locating the articles. Both websites maintain the latest revisions of the articles. Before using the articles, please ensure the latest revisions are being used, as the articles are updated on an as-required basis by the writer and given new revision numbers.

Citroen Classic Owners' Club of Australia: Technical Articles

Citroen Car Club of Victoria: Tech Tips

1. 2CV 40-Litre Fuel Tank
2. 2CV API GL-4 Gearbox Oil
3. 2CV Battery Charging Circuit
4. 2CV Battery Problems Solved
5. 2CV Brake Saga
6. 2CV Buyer's Questions
7. 2CV Carburettor Cover Screws
8. 2CV Carburettor Jets and Adjustments
9. 2CV Engine Problems
10. 2CV Fuel Filter
11. 2CV Fuel Gauge and Battery Meter
12. 2CV Gearbox Output Hubs
13. 2CV Gearbox Unwinding Debacle
14. 2CV Hard Luck Stories
15. 2CV Headlights Improvement
16. 2CV Ignition Coil
17. 2CV Knife Edges Replacement
18. 2CV Low Oil Pressure Beeper and Lights On Beeper
19. 2CV Maintenance - Part 1 of 2
20. 2CV Maintenance - Part 2 of 2
21. 2CV Oil Breather
22. 2CV Oils and Maintenance Advice From Burton
23. 2CV Points Ignition Reinstallation
24. 2CV Roof Rack
25. 2CV Secondary Choke Butterfly Adjustment
26. 2CV Spare Parts to Carry
27. 2CV Valve Clearance Adjustment
28. 2CV Workshop
29. Better Fuel Hose Clamps – **applies to all vehicles**
30. Better UHF CB Car Radio Performance – **applies to all vehicles**
31. Ignition Coil Ballast Resistors – **applies to all vehicles**

FINAL STATEMENT

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